



# Airspace and Traffic Samples

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# Overview

- (my soap-box)
  - General Approach
  - Measures
- Generic Airspace
- Levels of Traffic
- Scripts
- Traffic Samples
- Learning Effects





# General Approach

To maximize our gain:

- Repeated Measures Design
- Many experiments folded into one.
  - Several aspects of controller behavior and performance
  - Analyses of different aspects independently to form a “profile”





# General Approach (continued)

## Measures

- Questionnaires and Self-Ratings
- Subject Matter Expert Observer Ratings
- Workload
- Audio-Video Recordings
- Communications
- Standard Simulation (System) Measures
- Efficiency
- Situational Awareness
- Visual Scanning





# Fidelity

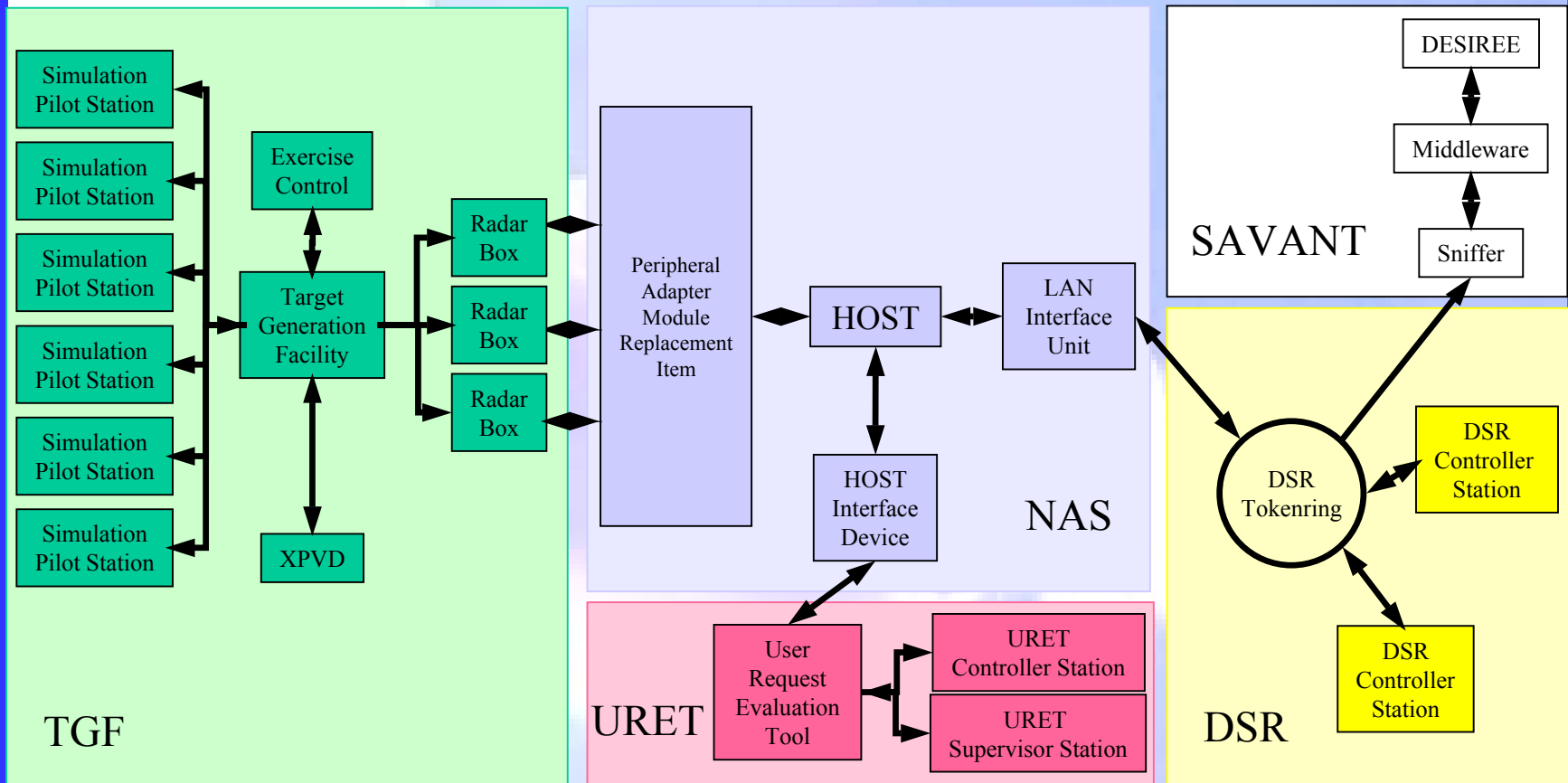
- How real for realism?
- Operational systems or something with the look and feel of the real thing?
- Existing airspace or something with the look and feel of real airspace?





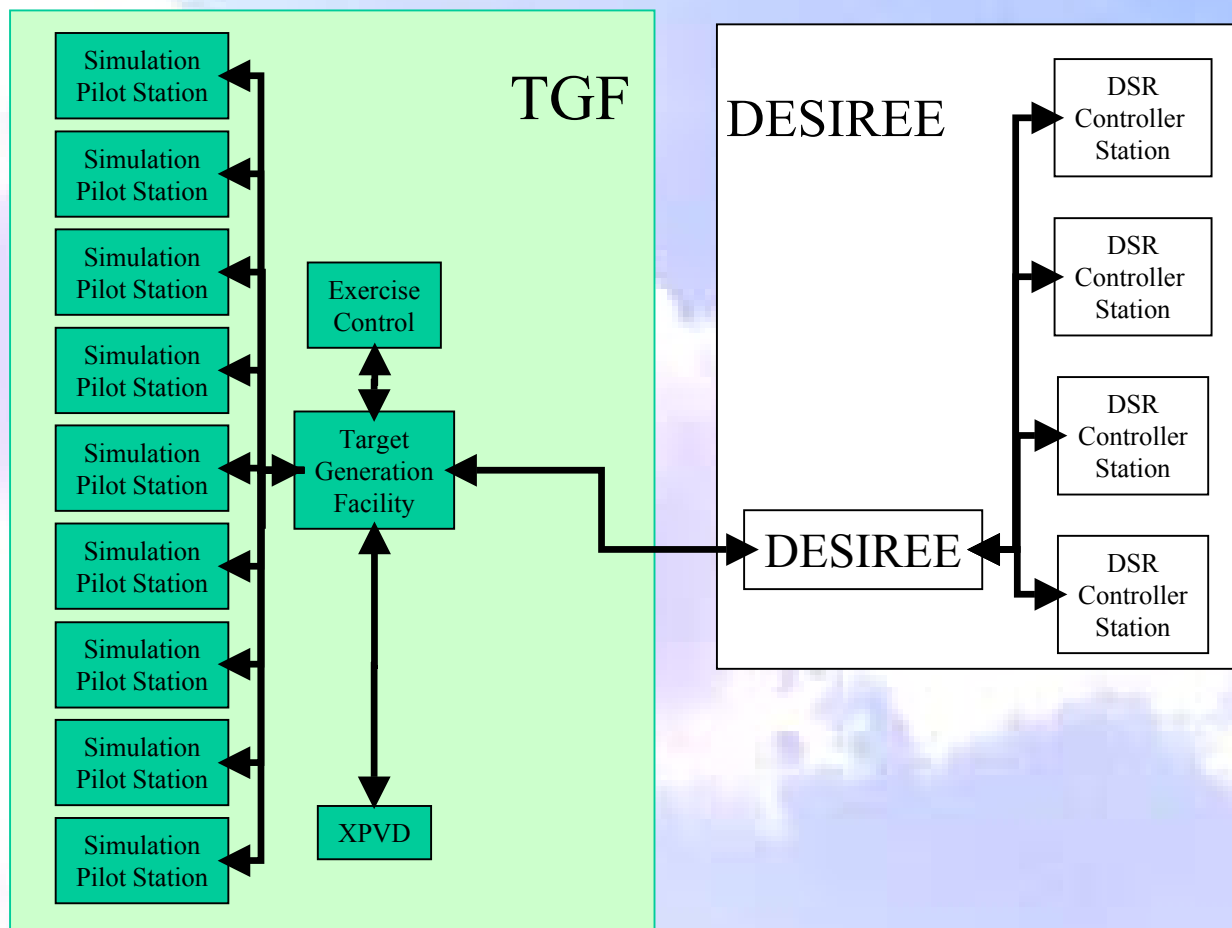
# DSAR1 Implementation

## DSAR TGF/HOST/DSR/URET





# SABET Implementation





# Generic Airspace

- Not a new concept
  - Aerocenter High as used at the FAA Academy
  - ZCY or Universal Data Set (UDS) for Operational Test and Evaluation (documentation dated 1973)
  - Initiated in our laboratory as separate enroute and terminal airspace in 1994/95







# Generic Airspace: Advantages

- Easy to learn
- Controllers from any airspace
- Controllers start at level playing field
- Results generalize to NAS





# Generic Airspace: Disadvantages

- All participants have to learn
- Specific airspace related habits may not be transferred to the generic airspace
- No airspace specific results





# Generic Airspace: When to Use

- Concept Research
  - Change in systems
  - Change in procedures
- Do not use it when you are about to implement a facility specific system procedure





# Generic Enroute Sector

- Used with ZJX controllers
  - tested on own airspace and generic airspace to determine if using generic airspace affected controller behavior
  - to determine time needed to train on generic airspace
- Naming convention based on compass rose





## GENERA SECTOR: ADJACENT SECTORS AND FACILITIES







# Generic TRACON Airspace

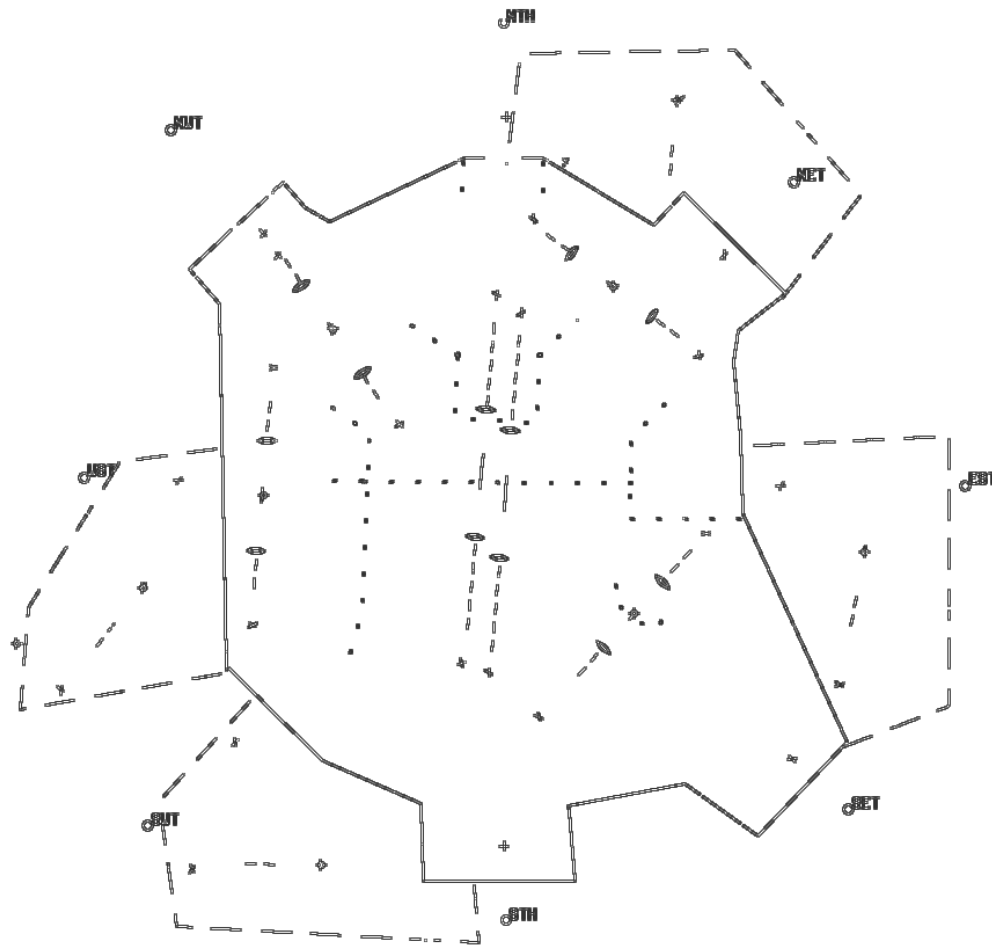
- Four Corner Post Layout
- Naming convention based on compass rose







# Generic TRACON Airspace







# What Happened Next...

- Go study automation
  - User Request Evaluation Tool (URET)
    - Not connected to our simulator
    - Available with Display System Replacement (DSR)
    - How to get a good sample size of non-URET-trained controllers
- Create a Generic Center







## *DSAR1 Implementation (continued)*





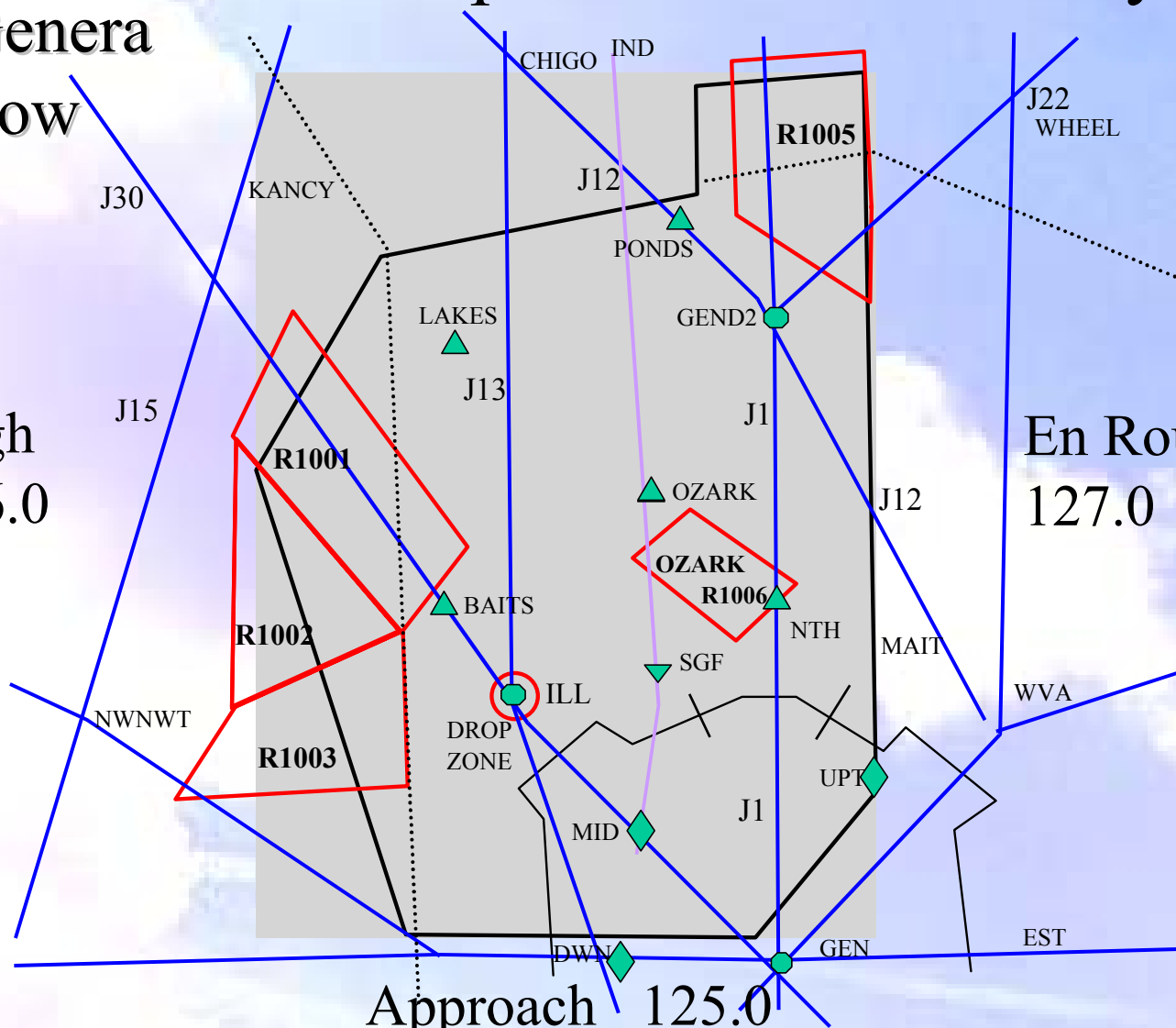
# Generic Airspace for DARC Study

Genera  
Low

High  
126.0

En Route  
127.0

Approach 125.0







The map displays a network of blue lines connecting various cities across the United States. The central region, shaded in green, is labeled 'GEND2' and 'ILL NTH GEN'. This central area is surrounded by other regions, each labeled with state abbreviations and city names. The blue lines represent a network of connections between these locations. The map is divided into several regions, with a central green-shaded area labeled 'GEND2' and 'ILL NTH GEN'. The regions are labeled with state abbreviations and city names. The blue lines represent a network of connections between these locations.







The map shows the United States divided into 31 numbered regions. The central region, labeled 27, is colored green and includes the states of Iowa (IOW), Wisconsin (WIS), Illinois (ILL), and Missouri (MO). Surrounding this central region are 10 purple regions, each labeled with a number in a large, bold, red font: 02 (Northwest), 03 (Northeast), 04 (Southeast), 05 (South), 06 (West), 07 (North), 14 (East), 28 (Southwest), 29 (South), and 30 (South). The remaining 20 regions are labeled with numbers in a large, bold, black font: 01 (North), 08 (Northwest), 09 (Northwest), 10 (Northwest), 11 (Northwest), 12 (Northwest), 13 (Northwest), 15 (Northwest), 16 (Northwest), 17 (Northwest), 18 (Northwest), 19 (Northwest), 20 (Northwest), 21 (Northwest), 22 (Northwest), 23 (Northwest), 24 (Northwest), 25 (Northwest), 26 (Northwest), 27 (Northwest), 28 (Northwest), 29 (Northwest), 30 (Northwest), 31 (Northwest). The map also includes state abbreviations and a network of blue lines connecting various points.





# Levels of Traffic

- We use an “operational” definition, a.k.a. “ask the experts”
- Personally I prefer to train controllers on “moderate” traffic and use levels that are “low” and “high” for experimental scenarios
- It would be a lot better if we could better define/characterize our scenarios in a more objective way







# Scripts

- ...or stuff happens
- when using scripts, bring in some “naive” controllers in a pilot study to see if the scripts actually work
- make sure that you have your measures in place that capture the essence of the script





# Traffic Samples

- Real airspace
  - Sampling Strategy
  - Data Collection
  - Data Screening
  - Scenario Generation
  - Scenario Shakedown
- Generic airspace
  - Define Traffic Requirements
  - GYOT (generate your own traffic)
  - Scenario Shakedown





# Learning Effects

- Control for order effects
  - counter balancing
  - rotation of scenarios under experimental conditions
- Sometimes (in my opinion often) you cannot get away with using multiple scenarios to prevent learning effects:
  - if you are interested in local events or situations, e.g.:
    - with this enhancement, are aircraft better spaced over a fix?
    - With change in procedures, will aircraft fly more efficiently?



